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INSTITUTE OF GAS TECHNOLOGY

THE GAS INDUSTRY'S OWN EDUCATIONAL AND RESEARCH FACILITY

CHICAGO 16, ILLINOIS

GAS ABSTRACTS

MAY 1957

VOLUME 13 NUMBER 5

AFFILIATED WITH

ILLINOIS INSTITUTE OF TECHNOLOGY

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O. P. BRYSCH, Editor

GAS ABSTRACTS is published and distributed monthly by the Institute of Gas Technology, Chicago 16, Illinois. The contents of selected papers and patents are reviewed impartially by the editorial staff and material of potential interest to the Gas Industry is presented. Subscription rates to non-members of the Institute: $18.00 per year to U.S. addresses; $22.00 foreign.—Printed in the U.S.A.

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A microfilm edition of Gas Abstracts can be supplied by University Microfilms, 313 N. First St., Ann Arbor, Michigan.

1. GAS INDUSTRY

Atomic Energy Control

Thomas, M. ATOMIC ENERGY AND CONGRESS. Ann Arbor: University of Michigan Press; London: Oxford University Press, 1956.

The history of government control of atomic energy is traced from the time of complete federal ownership and control during World War II to the present transition period where increasing responsibility for the peaceful applications of atomic energy is being assumed by private industry. This study of the processes and people involved in directing and controlling the atom is largely a treatise on government in action. Important government policy decisions relating to the nature and mechanism of control, and factors leading to the establishment of the Atomic Energy Commission and the Joint Committee on Atomic Energy of Congress are reviewed. This book stresses the teamwork and dynamic personality forces that were brought to bear on the multi-billion dollar atomic energy investment. Consideration is given to the mechanism of congressional appropriations, policy formation during 1947-1950, rapid expansion of the program during 1950-1952, and the years of Republican control. C. G. von Fredersdorff

Canadian Industries

HOW THE GORDON REPORT STACKS UP. *Canadian Chem. Processing 41,* 10-12, 14, 16 (1957) February.

The Royal Commission on Canada's Economic Prospects recently issued a bulky preliminary report. The chemical manufacturers viewpoint, which pointed out the past and present imbalance in the secondary manufactures industries, is publicized in this article to present the immediate problems and the necessary solutions to advance Canada's strength and prosperity. An enlarged chemical market is desirable for the economy in regard to employment and growth, rather than the present position as a supplier of raw materials or bulk chemicals. Questions of exports, foreign investment, and the doubly aggravated shortage of technical manpower are discussed.

O. P. Brysch

Coal Research

Igoe, J. W. and Rose, H. J. COAL RESEARCH IN '56. *Mining Congr. J. 43,* 106-12 (1957) February; Bituminous Coal Research, Inc. reprint.

The rate of effort on coal research in 1956 will not differ significantly from that in 1955, during which expenditure of $17,382,000 was reported in an authoritative project review by Bur. Mines Inf. Circ. 7754. Thus research invested on coal still lags far behind other large industries (about one-eighth of that in petroleum). Coke and coal chemicals, mining, gasification, and hydrogenation projects in order consume ¾ of expenditures of funds furnished primarily from federal, outside industrial, and equipment manufacturing sources. Active projects by governmental, industrial, and school groups are briefly described and broadly classified under coal properties, production and preparation, coal as fuel, and coal conversion. Vast expansion in foreign coal research is noted. O. P. Brysch

Gas Price and Exploration

GAS SHORTAGE FEARED. *Oil Gas J. 55,* 109 (1957) February 18.

The counsel for Phillips Petroleum Co., H. K. Hudson, states that a natural gas shortage will occur in 10 years unless discoveries are increased substantially. The present low price is the cause of the low exploration rate according to the attorney. W. G. Bair

Oil for Europe

THERE'S PLENTY OF OIL FOR EUROPE NOW. *Oil Gas J. 55,* 78-81 (1957) February 25.

Criticism of the U. S. oil industry in supplying oil for Europe's shortage has been allayed by several actions which were taken or made public during the week beginning February 18. These actions included: 1) increasing Texas allowable for March 237,000 bbl daily (to a total Texas increase of 380,000 bbl since Suez emergency); 2) cut-back of crude oil run to stills by 200,000 bbl daily, with yield-change to more fuel oil; 3) season-end reduction of U. S. heating oil needs. Testimony given to the House and Senate Committees is briefly outlined, with respect to monopoly, price increases, tanker space, independent production and Venezuelan oil. O. P. Brysch

Sales to Pipelines

Federal Power Commission. DIRECT SALES BY PRODUCERS OF NATURAL GAS TO REPORTING INTERSTATE NATURAL GAS PIPELINE COMPANIES—1955. Washington F.P.C. 1957; *Gas Age 119*, 19-27, 38 (1957) Febraury 21.

This compilation reports on direct sales by volume and revenue of gas by some 5,000 producers, and was prepared from the annual reports of natural gas companies to the F.P.C. A revenue of $586,635,042 was reported for the sale of 5,513,299,774 MCF in six tabulations by state and producers. R. T. Ellington

2. APPLIANCES

Appliance Ventilation

Bennett, W. J. and Purkis, C. H. EXPERIMENTS WITH SHARED AND INDIVIDUAL FLUES FOR GAS APPLIANCES. Instn. Gas Engineers (British) Comm. No. 495, 39 pp. (1956) November; *Gas World* (British) *144*, 1076 (1956) November; *Gas J.* (British) *289*, 29-32 (1957) January 2.

Sound design of ventilation of gas appliances in Britain's new multi-story blocks of residential flats is discussed in this interim report. Theory and test results of flow and pressure in flues of various heights, in individual, common, branched, balanced and U-duct flue systems are discussed, together with current building code practice, and foreign usage. Graphical and tabulated data and a 38-item reference list are included. O. P. Brysch

Carne, J. B. and White, T. T. OBSERVATIONS ON THE PERFORMANCE OF A MULTI-FLUE SYSTEM AND OF A SINGLE DUCT FOR APPLIANCES WITH ROOM-SEALED COMBUSTION CHAMBERS. Instn. Gas Engineers (British) Comm. No. 496, 47 pp. (1956) November; *Gas J.* (British) *289*, 32, 37-46 (1957) January 2; *Gas World* (British) *144*, 1077 (1956) November.

Experimental results on a laboratory individual flue system are used to predict performance in formulae of a theory based on energy distribution. Also a system supplying combustion air sealed off from the room, the Se-Duct, is discussed. Flue area, flow resistance, heat transfer and construction advantages are discussed in detail. Extensive discussion of this, and of Comm. No. 495, are included in the journal. O. P. Brysch

Approved Cookers

A.G.A. Laboratories AMERICAN STANDARD APPROVAL REQUIREMENTS. A.S.A. Z 21. 31—1956 Approval Requirements for Gas Counter Appliances—Effective Jan. 1, 1957.

A.S.A. Z 21. 1.1.—1956 Approval Requirements for Domestic Gas Ranges — Effective Jan. 1, 1957. Vol. I, Free Standing Units. Vol. II, Built-In Units.

Burners

Bourner, H. L. (assigned to Landis Tool Co.) FUEL BURNING RADIANT AND AIR HEATER. U.S. 2,782,780 (1957) February 26.

Broyhill, R. F. STOCK TANK HEATER. U.S. 2,782,781 (1957) February 26, 1957.

Chambers, J. E. (assigned to Chambers Corp.) MOUNTING FOR ROTATABLE GAS BURNER. U.S. 2,782,779 (1957) February 26.

O'Connor, L. T. BURNER FOR GLASS BLOWING LATHE. U.S. 2,781,832 (1957) February 19.

Burner Controls

Cassidy, R. J. (assigned to General Motors Corp.) BURNER SAFETY CONTROL SYSTEM WITH PURGING. U.S. 2,781,830 (1957) February 19.

Feyling, P. L. F. (assigned to J. W. Greer Co.) FLUID FLOW CONTROL FOR GAS BURNER. U.S. 2,781,833 (1957) February 19.

Kindl, F. J. (assigned to The W. J. Schoenberger Co.) GAS RANGE BURNER CONTROL. U.S. 2,781,779 (1957) February 19.

Stanley, R. F. and Day, F. M. (assigned to Pioneer Water Heater Corp.) SAFETY GAS CONTROL SYSTEM FOR HOT WATER HEATERS. U.S. 2,781,977 (1957) February 19.

Gas Ovens

Hampel, T. E. and Neu, R. F. HEAT APPLICATION TO GAS-FIRED, PORTABLE DECK BAKE OVENS. Research Bull. 73, Project IA-2, Amer. Gas Assoc. Laboratories, New York (1956) November.

Means are outlined for improving the performance of conventional direct-fired or muffled bake ovens. The value of increased turbulence in baking compartments of direct-fired types, and of reducing the excess combustion air in various types of oven are discussed. Use of power burners on the appliances was given some treatment. R. T. Ellington

Speidel, P. A. PERFORMANCE CHARACTERISTICS OF GAS OVENS. Research Report No. 1264, Project DER-11-C, Amer. Gas Assoc. Laboratories, (1956) December.

The effect of uniformity of flow of gases on heat distribution, and of burner position, flue outlet location, location of oven bottom openings, secondary air baffles and materials of construction on heat transfer were investigated for both direct and indirect fired ovens. For both types the proportion of heat transferred by radiation ranged between sixty and seventy percent. The effect of loading was also considered. This report extends the information already presented in Reports 1176 and 1182. R. T. Ellington

Refrigeration

Stoecker, W. F. HOW FROST FORMATION ON COILS AFFECTS REFRIGERATION SYSTEMS. *Refrig. Eng. 65,* 42-46 (1957) February.

The refrigeration systems studied were forced convection, finned coil, operating under frosted conditions. The factors most critically affected by frost are the coefficient of heat transfer and the pressure drop of the air through the coil. The author concludes that because of the pressure-drop increase as frost accumulates, wide fin spacing is more desirable as opposed to close fin spacing. N. D. Smith

PROPOSED ASRE STANDARD 34. *Refrig. Eng. 65,* 49-51 (1957) February.

A proposed Standard 34, Designation of Refrigerants, published for consideration by the membership of Amer. Society of Refrigerating Engineers, will be voted upon in June. Identifying numbers are assigned to each refrigerant and a classified list is given. O. P. Brysch

Water Heater Corrosion

Weast, W. C., EFFECT OF CERTAIN VARIABLES ON CORROSION OF GAS-FIRED DOMESTIC WATER HEATERS. Domestic Gas Research Project DJ-4-WH, Amer. Gas Assoc., 3-24 (1956) December.

The influence of tank volume, operating temperature, dissolved oxygen, water softening, galvanizing and flue location on corrosion rate of domestic water heaters, investigated in Project DJ-4-WH, are reported by Case Institute of Technology. R. T. Ellington

CORROSION OF GAS-FIRED DOMESTIC WATER HEATERS. *Air Condg. Heatg. and Ventilg., 54,* 76 (1957) March.

A corrosion study made under A.G.A. sponsorship indicates that corrosion rate in domestic water heaters is decreased in heaters having heavier galvanizing, and is increased by each of the following factors: tank capacity decrease, temperature increase, softening of the water, and use of copper dip tubes. J. J. Guyer

Weather—Demand Relation

Mattersdorff, E. KAELTE, KLIMA UND KALENDER—GASTECHNISCH GESEHEN. (COLD, CLIMATE AND CALENDAR,—SEEN GAS-TECHNICALLY). *Gas- und Wasserfach* (German) *98,* 53-61 (1957) January 18; 104-10, February 1.

From the strong influence by weather and air temperature on the remarkably increasing demand of gas for fuel, thorough investigations and observations have been made which permit important predictions for gas distribution and for production of the plants. By means of carefully selected tables and curves from the field of meteorological and weather observations, as well as by gas-distribution statistics for the same periods, the author devises a correlation with the object of estimating the demands for gas, and the needed preparations in operations and supplies for the future period. Criteria of freezing and the analyses of 190 winters are presented here with a comparison of various German cities for a better gas supply. G. Kunst

3. COMBUSTION AND INDUSTRIAL FURNACES

Burner Design

Ward, T. THE USES OF JET BURNERS — AND ASSOCIATED PROBLEMS. *Gas J.* (British) *289*, 355-58 (1957) February 13.

Fundamental principles of gas burners and combustion are discussed as an introduction to more detailed exposition of tunnel or jet burners. Design, advantages, and applications are briefly treated. O. P. Brysch

Coal Combustion

HEAT GENERATION AND UTILISATION. *Brit. Coal Utilisation Research Assoc. Bull. 20*, 454-61, (1956) November.

The effect of size of coal on burning characteristics and pressure drop is qualitatively examined in relation to applications in stoker and hand-fired boilers, in blast furnaces, gas producers, pulverized fuel-fired apparatus and other appliances. Proper distribution of air and control of ash deposits are important considerations. C. G. von Fredersdorff

Combustion Charts

Kist, D. and Frumerman, R. SIMPLIFIED COMBUSTION CALCULATION. *Chem. Eng. 63*, 179-84 (1957) July.

A nomographic method is presented by which combustion problems are simplified. Examples of this method involving both complete and incomplete combustion of natural gas, kerosine and fuel oil are shown. These nomographic sene and fuel oil are shown. These nomographic charts are easily adapted to other fuels.
P. B. Tarman

Flame Research

Grumer, J., Singer, J. M., Richmond, J. K., and Oxendine, J. R. PHOTOGRAPHIC STUDIES OF TURBULENT FLAME STRUCTURE. *Ind. Eng. Chem. 49*, 305-12 (1957) February.

The accuracy and schlieren, smoke, and direct photography for the characterization of turbulent flames is examined. Evidence, based on direct photography, is presented that is contrary to the wrinkled laminar flame or the continuous reaction zone concept of turbulent flames. S. A. Weil

Grumer, J., Harris, M. E. and Rowe, V. R. FUNDAMENTAL FLASHBACK, BLOWOFF, AND YELLOW-TIP LIMITS OF FUEL GAS-AIR MIXTURES. U. S. Bur. Mines Rep. Invest. 5225 (1956) July.

This report presents the results of the Bureau of Mines investigation of flame stability based on the boundary velocity gradient concept. The fuels concerned are the paraffinic gases, ethylene, hydrogen, carbon monoxides and their mixtures. The application of the results to various shaped mono-port burners and the limitations of such application are discussed.
S. A. Weil

THE FLAME GIVES UP ITS SECRETS. *Fuel Efficiency* (British) *5*, 79-81 (1957) February.

This is a synopsis of the work being carried on by the International Flame Research Association in large-scale furnaces at Ijmuiden, Holland. Experiments are being conducted to determine the properties and influencing variables in gas, oil and solid fuel flames. Information on radiation from flames has led to the development of improved burner design. Results from operation of the large-scale experimental furnaces indicate that small-scale furnaces can be developed to predict the properties of full-scale flames. The necessity of using full-size flame has been the chief difficulty holding up progress in flame study research. J. M. Reid

Furnace Atmospheres

Vaughan, C. H. BASIC FURNACE ATMOSPHERES AND COMPOSITION EFFECTS. *Ind. Heating* 24, 248-58, 424 (1957) February; *Metal Progress 71*, 93-96 (1957) February.

A brief review article on basic heat treating atmospheres. R. T. Ellington

Gas Utilization

USE OF GAS IN PROCESS WORK. *Fuel Efficiency* (British) *5*, 72-74 (1957) February.

This is a resumé of fields of application covered by the "Gas at Work in Industry" exhibition held in London, January 22-February 2, 1957. Gas utilization in flame processing, metallurgical processes, radiant heating, glass treatment and drying are among the topics briefly discussed. J. M. Reid

Higgs, A. GAS IS COMPETITIVE. *Gas J.* (British) *289*, 414-18, 420 (1957) February 20.

Over six years a 38% increase in industrial gas sales by the West Midlands Gas Board indicates that high-priced town gas is an effective competitor of other fuels. Five examples are given of furnace and burner designs in conversions from producer gas to town gas, in metallurgical and ceramic plants. Technical advisory service by the Board on heating problems and furnace design is outlined.

O. P. Brysch

Glass Melting

Jack, H. R. S. and Richardson, D. A. COMPARATIVE FUEL TRIALS OF TWO GLASS MELTING FURNACES. *Fuel Efficiency 5*, 75-76 (1957) February; *J. Inst. Fuel 30*, 173-92 (1957) April.

This paper recently was presented at the Institute of Fuel. Careful heat balances were made on a tank furnace, one early and one late in its campaign. R. T. Ellington

Industrial Drying

Walter, L. DRYING AND BAKING BY GAS FOR FINISHING OPERATIONS. *Gas World* (British) *145* (Indust. Gas Sect.), 40-42 (1957) February 16.

The drying of paint or enamel coatings on products is discussed generally from standpoint of loads, heat transfer, type of heating and solvent removal. Author's Abstract

Industrial Heating

Atkinson, P. G. THE MEASUREMENT OF GAS STREAM TEMPERATURES IN INDUSTRIAL APPLIANCES. Gas Council Research Communication GC33, London: The Council, 1956, November.

This 35-page paper discusses the sources of error in gas stream temperature measurement and the development of an instrument in which these are eliminated. This unit was used to calibrate a simple portable suction pyrometer which gives good results in the field.

R. T. Ellington

Francis, W. E. FORCED RECIRCULATION IN INDUSTRIAL GAS APPLIANCES. Gas Council Research Communication GC34, The Council, London, 1956, November.

The advantages and limitations of the various methods of using recirculation in industrial heating applications are analyzed on the basis of fluid flow and heat transfer. General design procedures are developed. The optimum humidity and thermal efficiency for driers is discussed. The amount of recirculation induced by a high velocity jet burner was calculated and verified experimentally. R. T. Ellington

Oil Burner

HIGH-VELOCITY BURNER WINS CHEMICAL SPURS. *Chem. Eng. 64*, 164-66 (1957) February.

A number of applications are discussed of the oil burner using recirculation of combustion gases to vaporize the oil. The burner's characteristics approach those of gas burners.

R. T. Ellington

Open Hearth Combustion

Riviere, M. THE STEEL INDUSTRY AND INTERNATIONAL FLAME RESEARCH. *J. Metals 9*, 252-53 (1957) February.

This is an excerpt from a previous article by the author, which discusses qualitatively the improvements in open hearth operation resulting from the international effort being made at Ijmuiden, Holland. Gas flame emissivity has been increased by feeding certain percentages of oil with the gas. Use of air instead of steam for oil atomization has improved heat transfer and lessened oxidation of the charge.

R. T. Ellington

OPEN HEARTH FURNACE LIQUID FUEL COMBUSTION. *Ind. Heating 42*, 310-22 (1957) February.

A general discussion of furnace operation, furnace pressure problems, aerodynamics, variations in furnace gas composition and firing problems. R. T. Ellington

Propane-Oxygen Furnace

HIGH TEMPERATURE PROPANE-OXYGEN FURNACE. *Ceramics* (British) *9*, 14-16 (1957) February.

A high temperature furnace has been designed and constructed to fire refractory oxide samples to temperatures above 3500°F. The kiln is fired with propane and oxygen, using water-cooled burners. Stabilised zirconia refractories were used in the construction of the firing chamber. Editor's Abstract

Power Gas Burners

Lowe, F. J., Jr. INTRODUCTION TO POWER GAS BURNERS. *Gas Heat 8*, 37, 47 (1957) January.

A discussion of the questions asked regarding the installation, costs, and servicing of power gas burners. The conditions which call for power gas operation and the sources of advice necessary to economical installation and operation are mentioned. A. E. Richter

Schwank Burners

INFRA-RED RAYS THAW COLD COAL CARS. *LP-Gas 17*, 125 (1957) February.

Banks of Schwank-type infrared ceramic burners for LP-gas have been developed by Perfection Industries Division of Hupp Corp. for thawing frozen coal cars. Units demonstrated to officials of railroads, coal, steel and utility companies at Toledo indicated that this may be a faster, cheaper and safer solution of a major coal handling problem. O. P. Brysch

4. GASIFICATION AND CARBONIZATION

Carbon Reactions

Dotson, J. A., Koehler, W. A., Holden, J. H. RATE OF THE STEAM-CARBON REACTION BY A FALLING-PARTICLE METHOD. *Ind. Eng. Chem.* 49, 148-54 (1957) January.

The kinetics of the steam-carbon reaction was studied for the temperature range 1800°-2500° F. using carbon particles smaller than 200-mesh suspended in steam in a cylindrical tube 3 in. I.D. by 6½ ft. long. Carbons used were a petroleum coke and an electrode graphite. The conversion of petroleum coke was found to be an almost linear function of residence time. For electrode graphite the initial conversion was much greater than for the petroleum coke, but the rate descreased with time. Activation energies determined from the Arrhenius plot were 95,400 Btu/lb-mole for the petroleum coke, and 148,900 Btu/lb-mole for the electrode graphite. Indications are that the reaction is surface or chemically controlled and is not affected by the rate of diffusion to the carbon surface. E. J. Pyrcioch

Browning, J. A., Tyler, T. L., and Krall, W. G. EFFECT OF PARTICLE SIZE ON COMBUSTION OF UNIFORM SUSPENSIONS. *Ind. Eng. Chem.* 49, 142-147 (1957) January.

The lean limit of flammability was determined on 10-micron size fractions of a low melting-point wax, methylene bistearamide, for the range 10 to 90 microns in a closed-loop ignition bomb. The 60-micron size suspension was shown to burn at the lowest air-fuel ratio and to produce the most stable system in relation to the lean limit of flammability. Peak pressures at various fuel concentrations recorded in these tests, show that the maximum pressure is inversely proportional to particle size and that the peak pressure, in each case, is attained at a mixture well above stoichiometric. Next to turbulence, particle size is believed to have the major influence in the lean limit of combustion of sprays and solid suspensions.

E. J. Pyrcioch

Coal Gasification

Nistler, F. THE RUHRGAS VORTEX COAL-DUST PRODUCER. *Coke and Gas* (British), *19*, 54-57 (1957) February.

The design and operation of an experimental gas producer plant in the Ruhr are described and discussed. The plant uses a low-grade bituminous coal containing 17 percent ash, providing a 100 Btu gas for heating the coke ovens. Gasification takes place in a 6½ ft diam. reactor which is fed by a system of six tangential coal-dust nozzles at a rate of 100 tons of coal per day and by injected air preheated to 1300° F. Temperatures within the vortex chamber are above fusion range of the ash so that slag flows down the walls into a water-seal slag tap. Overall thermal efficiency of the plant is 84.2 percent, with 61 percent of the coal heating value recovered as gas heating value, and 23.2 percent as waste-heat steam. Cost of the producer gas from a vortex product is stated as being 72 percent of the cost of coke-producer gas. E. J. Pyrcioch

Roberts, I. METHOD OF GASIFYING SOLID FUEL. U. S. 2,782,109 (1957) February 19.

The patent describes a cyclic unit consisting of two generators for gasifying caking bituminous coal with steam and oxygen-enriched air using coal bed depths of 15 to 25 feet. Caking properties of the coal are destroyed by slow oxidation of the fusible constituents of the coal

during the steam preheat cycle by adding a quantity of oxygen to the steam. E. J. Pyrcioch

Ryder, C. PRESSURE GASIFICATION: PART I. *Gas Times* (British) *90*, 56-57 January 18; PART II. *90*, 119-21 (1957) February 1.

The process and equipment details of a possible Lurgi pressure coal gasification installation having a capacity of 15 MMCF/day of a gas with a heating value of 400 Btu are examined. The gasifier would operate at a pressure of 370 psi with a portion of the process steam being generated in jacket boilers around the gasifier, and the remainder in a water-tube boiler plant, while oxygen of 98 percent purity would be produced in an oxygen plant. Low-pressure steam at 55 psia produced in a water-tube waste-heat boiler would be employed to produce power in a turbo-alternator. Benzole and organic sulfur removal would be accomplished by oil washing at 25 atm pressure. Carbon dioxide in the gas is reduced to 20% by water scrubbing which also removes the greater part of the H_2S. Electric power is recovered by passing the compressed gas through an expansion turbine. Part II. on the requirements for a proposed 15 MMCF per day Lurgi gasification plant presents a detailed steam and power balance for the plant and a plant capital cost estimate with a breakdown of costs for the major plant components. The heat balance shows that a gas production efficiency of 67 percent can be achieved. The total capital cost for the plant is estimated at £ 1,923,100 ($5,384,400). It is concluded that Lurgi gas could be produced in the London areas for less than 10 d (12 cents) per therm. E. J. Pyrcioch

Dust Removal

Crampton, L. T. DUST SEPARATORS OF THE CYCLONE TYPE. *Fuel Efficiency* (British) *5*, 87 (1957) February.

A summary of recent patents includes the description of an improved cyclone dust separator especially suited to removal of fine "sticky" dusts such as carbon black from gas streams. The claimed improvement is obtained by very simple modification of the geometry of the gas inlet in a standard cyclone. (Brit. Pat. 762,070; Jones Gas Process Co., Ltd.) J. M. Reid

Nuclear Gasifier

Ritzman, R. W. NUCLEAR TEST REACTOR GIVING 2500° F. GASES CAN BE BUILT TODAY. *Chem. Eng. Progress 53*, 98, 100 (1957) February.

The author of the ORSORT study team claims that a nuclear test reactor operating upwardly of 2500° F. can be built on the basis of materials and technology now available, and that 3000° F. soon is expected to be attainable. Supporting U. S. Bureau of Mines bench-scale tests are cited wherein a nuclear reactor is simulated by a ceramic tube at 3000° F, and another test where coal is heated by induction to 1000° F. If the process fulfills the claims, nuclear energy at high temperature would have an economic advantage over conventional methods of coal gasification in that an oxygen plant would not be needed, and by obviating the combustion, coal would be saved. K. W. Davis stated that the AEC is interested in developing a high-temperature nuclear reactor and that there remains "some proving to be done." *Abstractors Note:* Ceramic nuclear fuel elements appear to have an upper operating temperature limit of 1500° F. Fission products diffuse through ceramics at this temperature, an effect increasing with temperature. Some of the proving therefore would be how to prevent contamination of high-temperature steam by fission products, since this steam is the source of heat for coal gasification. No ceramics of suitable characteristics are available for 2500-3000° F. nuclear fuel operation. If the nuclear fuel were not contained in a ceramic or other protective coating at these temperatures, any gas exchanging heat in the reactor would become contaminated with fission products, which is unacceptable, since the coal gasifier gases would then be radioactive. Further if the heat exchange medium is steam, an additional difficulty arises in that at 2500-3000° F., a portion of the steam is thermally dissociated and this oxygen becomes radioactive by neutron-proton reaction. C. G. von Fredersdorff

Sonic Gasifier

Totzek, F. (assigned to Koppers Co., Inc.) APPARATUS FOR THE PERFORMANCE OF ENDOTHERMIC REACTIONS BETWEEN SOLID AND GASEOUS MEDIA. U. S. 2,777,-813 (1957) January 15.

Reactors are described for the production of

water gas by gasification of pulverized coal with oxygen and steam and for the production of calcium cyanamide from calcium carbide and nitrogen in which the reacting components are subjected to sonic waves for acceleration of the reactions. E. J. Pyrcioch

Water Gas

Spivey, E., and Williamson, C. H. THE PRODUCTION OF WATER GAS AT BECKTON. *Gas J.* (British) *289*, 238-51 (1957) January 30.

The design features of two large carburetted water-gas sets at Beckton, England are presented along with operational information and performance data. The first plant, put in operation in 1951, has four 9-ft diam. generators with a maximum output of 26.5 MMCF per day of a 474 Btu gas. Coke consumption is approximately 30.1 lb/MCF dry gas and oil consumption of a 1.34 therms/gallon oil is 1.65 gal/MCF. Cycle duration is 2.42 minutes. An oil/steam ratio of 22:1 to 26:1 was employed with a process-steam consumption of 51 to 57 lb/MCF gas. The second plant, operated initially in September, 1954, has three generators of 11 ft 6 in. diam. Output of one generator is 9 MMCF/day with no appreciable variations in coke and oil gasification efficiencies as compared with those obtained before on smaller sets. E. J. Pyrcioch

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Drill Bits

Bentson, H. G. MODERN DRILLING—ROCK-BIT DESIGN, SELECTION AND EVALUATION: PART 13: CROSS-SECTION AND TWO-CONE BIT DESIGNS. *Oil Gas J. 55*, 127 (1957) January 14.

Design factors previously discussed (*Gas Abs. 13*, 26 (1957) Feb.) for three-cone rock bits are applied also in cross-section and two-cone bit designs. Journal angles, facings and bearing capacities are outlined for Type A and C cross-section bits. O. P. Brysch

Bentson, H. G. ROCK-BIT DESIGN. PART 16: WHAT DULL BITS CAN TELL YOU. *Oil Gas J. 55*, 145 (1957) February 25.

A study of dull bits, with respect to loose bearings, broken teeth, and uneven wear, can indicate need for proper bit selection and also for changes in factors such as: bit weight, rotary speed, rotating time, collar stabilization, break-in procedure and hydraulics. O. P. Brysch

Drilling

Lubinski, A. HOW SEVERE IS THAT DOG-LEG? *World Oil 144*, 95, 96, 98, 102, 104 (1957) February 1.

If a single shot directional survey indicates a change in both the inclination and direction, the severity of the dogleg can be read directly from charts. Author's Abstract

HOW WEIGHT-SPEED AFFECT PENETRATION. *World Oil 144*, 120 (1957) February 1.

Many variables contribute to the progress the bit makes through a formation, i.e., weight, rotary speed, type and weight of drilling fluid, type of bit, etc. In order to develop a relationship between two or more of these variables the AAODC is conducting tests.

Editor's Abstract

Drilling Patents

Bielstein, W. J. (Assigned to Esso Research and Engineering Company) DEVICE FOR DRILLING WELLS. U. S. 2,780,438 (1957) February 5.

Brown, B., ROCK DRILL BIT. U. S. 2,776,819 (1957) January 8.

Gilbert, W. E. (assigned to Shell Development Co.) METHOD AND APPARATUS FOR SUBMERGED WELL DRILLING. U. S. 2,783,027 (1957) February 26.

Gregory, N. and Yeatman, C. A. (Assigned to Shell Development Co.) DRILLING APPARATUS. U. S. 2,776,817 (1957) January 8.

Harrigan, D. W. METHOD OF PULLING A DRILL STRING. U. S. 2,782,004 (1957) February 19.

Jackson, J. G. (Assigned to Well Completions, Inc.) APPARATUS FOR AND METHOD OF EARTH BORE DRILLING. U. S. 2,776,816 (1957) January 8.

Jamison, Jr., T. E. (assigned to Jones, W. T., Harding, R. L., Jamison, Sr., T. E., Sampson, M., Love, G. and Koehne, Jr., C. F.) DRILL

McCune, J. S. and Hanks, W. E. (assigned to Oilwell Drain Hole Drilling Co.) PREPARATION OF WELL DRAIN HOLES FOR PRODUCTION. U. S. 2,778,603 (1957) January 22.

Ortloff, J. E. (assigned to Esso Research and Engineering Co.) PELLET IMPRACT DRILL BIT WITH CONTROLLED PELLET RETURN. U. S. 2,779,571 (1957) January 29.

Reistle, C. E. Jr., (assigned to Esso Research and Engineering Co.) METHOD FOR PREVENTING LOST RETURNS. U. S. 2,778,604 (1957) January 22.

Reistle, C. E. Jr., (assigned to Esso Research and Engineering Co.) METHOD FOR FRACTURING FORMATIONS. U. S. 2-783,026 (1957) February 26.

Roper, W. R. (assigned to Houston Oil Field Material Co., Inc.) JOINT. U. S. 2,779,570 (1957) January 29.

Walker, E. G., WELL DRILL BIT. U. S. 2,776,-818 (1957) January 8.

Exploration

Roth, R. TEXAS PANHANDLE PALEOGEOLOGY. *World Oil 144*, 82-84, 86 (1957) February 1.

Cuttings from hundreds of wells drilled in the Panhandle of Texas have been examined and fossil content identified. Using this information as a base, the stratigraphic column has been subdivided into 14 time-stratigraphic units. The lithology and organic environment of each unit are briefly described; an isopachous figure portrays the areal distribution. Petrographic analyses have been made of Pre-Cambrian rocks encountered by the drill. The tectonics and sedimentation are discussed in a regional light.

Author's Abstract

Shenkel, C. W., Jr. ABILENE ANTICLINE INDICATES EXPLORATION POTENTIAL. *World Oil 144*, 77-80 (1957) February 1.

Well defined anticline fold 75 miles long offers excellent chances for successful tests on many undrilled structural features.

Author's Abstract

Gas Holder Construction

Albone, T. PRESTRESSED CONCRETE APPLIED TO A GASHOLDER TANK AT YORK. *Gas J.* (British) *289*, 453, 454, 458-60 (1957) February 27. *Gas Times* (British) *90*, 287-89, March 29; *91*, 22 (1957) April 12.

Design and construction of a concrete holder tank for a spirally-guided holder are discussed in some detail. O. P. Brysch

DVGW-RICHTLINIEN FUR DIE HERSTELLUNG VON NIEDERDRUCK-GASBEHALTERN UND RICHTLINEN FUR LIEFERUNGSVEREINBARUNGEN (KURZBEZEICHNUNG: HERSTELLUNGS-RICHTLINIEN) (GERMAN UNION OF GAS-AND-WATER-SUPPLY ENGINEERS, — DIRECTIONS FOR THE CONSTRUCTION OF LOW-PRESSURE GAS HOLDERS, AND FOR DELIVERY ARRANGEMENTS). Proposed October, 1956: Open for discussion until May 31, 1957. *Gas-u Wasserfach*, *98*, 153-65 (1957) February 15.

Directions are outlined for engineering details of construction which must be considered in the engineering design and specifications of low-pressure water-sealed and piston-type gas holders. O. P. Brysch

Shuttleworth, J. TWO SPECIAL PROBLEMS RELATED TO THE DECOMMISSIONING OF A SMALL GASHOLDER. *Gas J.* (British) *289*, 360-62 (1957) February 13.

Shutdown of a 200 MCF gasholder in a congested area for extensive repairs presented two problems,—1) disposal of holder-tank water and 2) gas supply to compensate for limited holder capacity. Potassium permanganate crystals were added to the water which was then discharged by atomizing jets into the river at a rate determined by River and Fisheries Board. A portable butane vaporizer and a temporary gas producer provided blended peak-load gas to augment the retort coal gas, with operations adjusted according to recorded peak-hours and earlier test-runs. O. P. Brysch

Gas Supply

Williams, C. FUEL INDUSTRIES 'HAVEN'T SEEN ANYTHING YET'. *Heatg., Pipg, and Air Condg. 29*, 150-51, 338 (1957) January.

The U. S. Bureau of Census forecasts a population of 228 million in 1975. This 50% increase, if standards of living remained constant, would mean a 50% increase in fuel consumption by 1975. Owing to their highly desirable physical forms, petroleum and gas fit into the new fuel technology admirably. Problems of the petroleum and natural gas industries in the future

will be to provide sufficient supplies rather than finding markets. G. Kunst

Jet Compressors

Dotterweich, F. H. and Mooney, C. V. GAS JET COMPRESSORS ARE AROUSING INTEREST. *World Oil 144,* 136, 139-41 (1957) February 1.

Producers are taking a closer look at this ingenious device as a means of putting low-pressure gas into intermediate pressure lines.

Authors' Abstract

Logging

Gastel, J. H. (assigned to Perforating Guns Atlas Corp.) ELECTRICAL LOGGING APPARATUS. U. S. 2,782,365 (1957) February 19.

Jakosky, J. J. (assigned to International Geophysics, Inc. and Signal Oil and Gas Co.) METHOD OF GEOPHYSICAL EXPLORATION. U.S. 2,782,865 (1957) February 26.

Moon, J. (assigned to Signal Oil and Gas Co.) BOREHOLE ELECTRODES. U.S. 2,779,915 (1957) January 29.

Shuler, E. W. Jr., Dunlap, H. F. and Gourley, L. E. Jr., (assigned to The Atlantic Refining Co.) METHOD AND APPARATUS FOR LOCATING DISPLACEABLE OIL IN SUBTERRANEAN FORMATIONS. U.S. 2,782,364 (1957) February 19.

Waters, H. C. (assigned to Perforating Guns Atlas Corp.) ELECTRICAL WELL LOGGING SYSTEM. U.S. 2,779,912 (1957) January 29.

Waters, H. C. (assigned to Perforating Guns Atlas Corp.) DUAL FREQUENCY WELL LOGGING SYSTEM. U.S. 2,779,913 (1957) January 29.

Oil-Gas Separator

Lovelady, I. W. and Kroeker (assigned to Sivalls Tanks, Inc.) LIQUID AND GAS SEPARATOR. U.S. 2,756,837 (1957) July 31.

This invention relates to a liquid and gas separator which employs centrifugal force as the separating agency, similar in operation to a cyclone dust separator. Use of a spherical vessel provides maximum structural strength, ease of fabrication, and more efficient separation of the oil and gas, with a minimum of volume.

B. E. Eakin

Pipeline Flow

Whatley, W. J. FLOW CHART SPEEDS DESIGN OF HIGH PRESSURE GAS PIPING. *Heatg., Pipg. and Air Condg. 29,* 193-4 (1957) February.

A flow chart based on the Weymouth formula for gas at 60° F. atmospheric pressure, and specific gravity of 0.60 (air = 1.0) is given for various pipe diameters. N. D. Smith

Reservoir Engineering

Cornell, D. UNSTEADY STATE FLOW IN GAS RESERVOIRS. *World Oil, 144,* 133-34 (1957) February 1.

A detailed procedure by which flow after flow problems, such as normally occur in field production or in back pressure testing of gas wells, may be solved using the Van Everdingen and Hurst solutions for unsteady state flow.

Author's Abstract

Sulfur Recovery

Miller, E. B. (assigned to Jefferson Lake Sulphur Co.) METHOD OF RECOVERING H_2S FROM NATURAL GAS. U.S. 2,771,964 (1956) November 27.

Elemental sulfur is recovered from natural gas by adsorption and subsequent conversion by an oxidation reaction. D. M. Mason

Thermal Drive Control

Ljungstroem, F. (assigned to Svenska Skifferolje Aktiebolaget) RECOVERING SUB-SURFACE BITUMINOUS DEPOSITS BY CREATING A FROZEN BARRIER AND HEATING IN SITU. U.S. 2,777,679 (1957) January 15.

This invention relates to a method of gasifying in situ and recovering bituminous sub-surface deposits where the intrusion of water from adjacent zones is controlled by freezing. The frozen barrier also prevents loss of produced gas, thereby increasing the efficiency of the thermal recovery process. B. E. Eakin

Well Practise

Coulter, A. W. CHEMICAL ADDITIVES IMPROVE FRACTURING. *World Oil 144,* 148-49, 152, 157-58 (1957) February 1.

Water, oil and acid in various combinations are being used to fracture formations. The characteristics of these fluids can be controlled for specific well conditions by the use of certain

additives. What are these additives? What can they do? How do they work? Here are the answers. Author's Abstract

Well Practise Patents

Baker, R. C. (assigned to Baker Oil Tools, Inc.) APPARATUS FOR LOWERING AND ELEVATING TOOLS IN WELL BORES. U.S. 2,776,012 (1957) January 1.

Bielstein, W. J. (assigned to Esso Research and Engineering Co.) RETRIEVABLE TUBING PLUG. U.S. 2,776,015 (1957) January 1.

Bielstein, W. J. (assigned to Esso Research and Engineering Co.) PERMANENT WELL COMPLETION APPARATUS. U.S. 2,781,098 (1957) February 12.

Clark, W. A. (assigned to The Texas Company) BOREHOLE GRAVEL PACKING. U.S. 2,776,011 (1957) January 1.

Garst, A. W. (assigned to Stanolind Oil and Gas Co.) INCREASING THE PERMEABILITY OF EARTHY FORMATIONS. U.S. 2,782,859 (1957) February 26.

Jones, R. V. (assigned to Phillips Petroleum Co.) WELL CEMENTING MATERIALS AND THEIR APPLICATION. U.S. 2,782,858 (1957) February 26.

Lee, J. A., Barclay, H. A. and Johnson, M. O. (assigned to Socony Mobil Oil Co. Inc.) TOOL FOR FRACTURING EARTH FORMATIONS. U.S. 2,776,014 (1957) January 1.

Morgan, B. E. and Prokop, C. L. (assigned to Esso Research and Engineering Co.) CEMENTING OF WELLS. U.S. 2,776,713 (1957) January 8.

Nowak, T. J. and Fischer, P. W. (assigned to Union Oil Co. of Calif.) METHOD AND COMPOSITION FOR SELECTIVE PLUGGING OF OIL WELLS. U.S. 2,781,850 (1957) February 19.

Stanclift, R. J. Jr., Draper, A. L. and Jenks, L. H. (assigned to Esso Research and Eng. Co.) PROCESS FOR OVERCOMING WATER BLOCKING OF A PETROLEUM PRODUCING WELL. U.S. 2,776,714 (1957) January 8.

Rike, J. L. (assigned to Esso Research and Eng. Co.) SEALING POROUS EARTH STRATUM. U.S. 2,776,010 (1957) January 1.

Tausch, G. H. (assigned to Esso Research and Eng. Co.) APPARATUS FOR COMPLETION IN A PLURALITY OF HYDROCARBON PRODUCTIVE STRATA. U.S. 2,776,013 (1957) January 1.

Well Tools

Medders, W. L. FISHING TOOLS AND TECHNIQUES. PART I: JARS. *World Oil 144*, 89, 91-94 (1957) February 1.

A description of the evolution of modern fishing tools, how they operate, their advantages and limitations—starting with the jars.
Author's Abstract

Well Tools Patents

Allen, G. H. (assigned to Lynes, Inc.) PACKER BRAID REINFORCING AND RETAINER. U.S. 2,778,432 (1957) January 22.

Baker, R. C. (assigned to Baker Oil Tools, Inc.) RETRIEVABLE WELL APPARATUS. U.S. 2,778,430 (1957) January 22.

Baker, R. C. and Conrad, M. B. (assigned to Baker Oils Tools, Inc.) RELEASABLE APPARATUS FOR RETRIEVING SUBSURFACE WELL DEVICES. U.S. 2,778,428 (1957) January 22.

Boer, G., O'Reilly, W. M. and True, M. E. (assigned to Esso Research and Eng. Co.)

Brown, C. C. WELL TOOLS. U.S. 2,778,433 (1957) January 22.

Brown, C. C. and McCray, G. REMOVABLE DRILL PIPE FLOAT VALVE. U.S. 2,777,523 (1957) January 15.

Cardwell, P. H. and Muir, P. D. (assigned to The Dow Chemical Co.) ACIDIZING WELLS. U.S. 2,778,427 (1957) January 22.

Chestnut, J. D. (assigned to Aerojet-General Corp.) OIL WELL TOOL. U.S. 2,781,099 (1957) February 12.

Fuson, T. J. and O'Reilly, W. M. (assigned to Esso Research and Engineering Co.) TOOL FOR REMOVAL OF FLUID FROM WELL BORES. U.S. 2,776,715 (1957) January 8.

Eklund, S. E. (assigned to The National Supply Co.) BROACH FOR WELL PIPE. U.S. 2,777,191 (1957) January 15.

Goodwin, J. S. (assigned to Globe Oil Tools Co.) MAGNETIC FISHING TOOL. U.S. 2,778,669 (1957) January 22.

Lynes, J. (assigned to Lynes, Inc.) WELL PACKER REINFORCING. U.S. 2,778,431 (1957) January 22.

Masters, R. W. WELL APPARATUS. U.S. 2,778,429 (1957) January 22.

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Cracking Catalysts

Johnson, M. F. L., Kreger, W. E., and Erickson, H. GAS OIL CRACKING BY SILICA-ALUMINA BEAD CATALYSTS: PORE SIZE AND PARTICLE SIZE EFFECT. *Ind. Eng. Chem. 49*, 283-87 (1957) February.

Experimental data on median pore size, pore volume, surface area, and product distribution for various silica-alumina bead catalysts are of value in predicting the performance of a catalyst. Reduction in particle size or increase in pore size and pore volume was found to improve cracking activity and selectivity.

Authors' Abstract

IOCC, 1956 Meeting

ANNUAL MEETING OF THE INTERSTATE OIL COMPACT COMMISSION, 1956. Oil and Gas Compact Bull. *15*, vi+75 pp. (1956) December.

All addresses and seven papers given at the 1956 Annual Meeting of the Interstate Oil Compact Commission are included. The discussion included matters such as, "New Suggested Form of an Oil and Gas Conservation Statute," secondary recovery, ratable take of gas and brine disposal. R. T. Ellington

Lubrication

Shannon, E. D. GAS-ENGINE, GAS-PLANT LUBE PROGRAM. *Oil Gas J., 55*, 102-05 (1957) February 11.

The 10 things Humble Oil and Refining Co. learned from their gas-engine-test and gas-plant-lubrication program are summarized and discussed. R. R. Amrine

Refinery Problems

Guthrie, V. B. 100+ OCTANE AFTER ONE YEAR. *Petrol. Processing, 12*, 61-63 (1957) February.

This article gives an outline of what refiners are thinking about the super-premium gasoline since it was introduced last fall. Their replies cover refining and marketing practices in all areas of the country. G. Kunst

Saskatchewan Oil

HIGH SUCCESS RATE SPURS SASKATCHEWAN DEVELOPMENT. *World Oil 144*, 75, 80 (1957) February 1.

About 15 operators are now actively developing this highly productive area. Thus far, approximately 42,000 acres have been proven and recoverable reserves are estimated to be 356,500,000 barrels. Editor's Abstract

Tankers

Wild, T. TANKERS BEST FOR TRANSPORTING MIDEAST OIL. *World Oil, 144*, 64, 66 (1957) February.

Tankers are the basic answer to the problem of providing dependable transportation for Middle East oil. They will keep the oil moving steadily to consumers. Pipe lines and canals will not surely do so. Oil movement through them can be too easily stopped through political or military action. Author's Abstract

Texas Oil Outlets

PRODUCERS SEEK PIPELINE SHOWDOWN. *Petrol. Week, 4*, 9-10 (1957) February 1.

The stage is being set in Texas for what may become the biggest intra-industry fight yet between independent producers and importers. It is being triggered by a petition filed with the Texas Railroad Commission by five independent producer organizations. The Texas independents charge that six major buyers of Texas crude are "throttling" West Texas pipeline outlets to "make way for the increasing flow of imported foreign oil into our country. The independents are fearful that unless the pipeline outlets are obtained before the Middle East transportation facilities are re-opened, their chances of getting relief are slim.

Editor's Abstract

7. ANALYTICAL METHODS AND TESTS

Carbon in Coke

Wilkinson, H. C. DETERMINATION OF CARBON IN COKE BY THE SHEFFIELD HIGH TEMPERATURE METHOD. *Fuel* (British) *36*, 39-42 (1957) January.

The Sheffield high-temperature method for the determination of carbon and hydrogen in coal can be used, without modification, for the determination of carbon and hydrogen for most types of coke. When the determination is to be carried out for unreactive foundry coke it is necessary to modify either the pushing schedule or the rate of flow of oxygen. Results are recorded for two Welsh foundry cokes, illustrating how these modifications preserve the accuracy of the test. It is concluded that the modified procedure should be applied only to cokes having a critical air blast greater than 0.075 or a volatile matter content of 0.5 per cent or less. Author's Abstract

Carbon Monoxide

Nelson, K. H., Grimes, M. D., Smith, D. E., and Heinrich, B. J. DETERMINATION OF TRACE AMOUNTS OF CARBON MONOXIDE IN GASEOUS HYDROCARBONS. *Anal. Chem. 29*, 180-89 (1957) February.

A method for the determination of 0 to 100 p.p.m. of carbon monoxide in saturated and unsaturated hydrocarbon gases is based on the reaction of carbon monoxide in methane with heated iodine pentoxide to form iodine and carbon dioxide. Methane does not react with heated iodine pentoxide but other hydrocarbons do react. In conducting the analysis, methane is first added to the sample to be analyzed. Low temperature fractional distillation removes the carbon monoxide from the sample and concentrates it in a methane fraction. The methane-carbon monoxide mixture is passed through a tube filled with activated charcoal to remove any traces of other hydrocarbons, then through a drying tube for removal of moisture, and finally through a heated combustion tube filled with alternate layers of iodine pentoxide and glass wool. The liberated iodine is collected in a potassium iodide solution and measured spectrophotometrically. In the range of 0 to 100 p.p.m., the accuracy of the method is within 1 to 2 p.p.m. Authors' Abstract

Chromatography

Bergman, E. D. and Gruenwald, T. PAPER CHROMATOGRAPHY OF POLYCYCLIC AROMATIC HYDROCARBONS. *J. Appl. Chem.* (British) *7*, 15-24 (1957) January.

The possibility of paper-chromatographic identification of mixtures of polycyclic aromatic hydrocarbons has been studied. In order to decrease the hydrophilic character of filter paper, it was either acetylated or impregnated with alumina, propylene glycol, vaseline or silicone. The systems studied were: anthracene and methylated anthracenes; fluorene and methylated fluorenes; phenanthrene, fluorene and anthracene; mixtures of tricyclic and of polycyclic hydrocarbons (found in the 'chrysene fraction'). Some success was achieved with separations in these systems. Authors' Abstract

Browning, L. C. and Watts, J. O. INTERPRETATION OF AREAS USED FOR QUANTITATIVE ANALYSIS IN GAS-LIQUID PARTITION CHROMATOGRAPHY. *Anal. Chem. 29*, 24-27 (1957) January.

In using gas-liquid partition chromatography for quantitative analyses of liquid and gas solutions, areas under the recorded curves are directly proportional to the weight-percent of the components if the thermal conductivities of the components are about the same. Where thermal conductivities of components differ, an empirical correction can be made by dividing the areas by the respective thermal conductivities. Direct calibration gives the most accurate results. Authors' Abstract

Haslam, J. and Jeffs, A. R. GAS-LIQUID CHROMATOGRAPHY IN A PLASTICS ANALYTICAL LABORATORY. *J. Appl. Chem.* (British) *7*, 24-32 (1957) January.

This report gives an account of the application of gas-liquid chromatographic methods to the general work of a plastics analytical laboratory. Particular attention is paid to the examination of monomers, of depolymerization products obtained from polymers, and of adhesives. The use of dinonyl sebacate as the stationary liquid phase in a particular problem involving the

determination of small amounts of methylcyclohexane in light petroleum (boiling range 60-80°) is described. Authors' Abstract

Percival, W. C. QUANTITATIVE DETERMINATION OF FLUORINATED HYDROCARBONS BY GAS CHROMATOGRAPHY. *Anal. Chem. 29,* 20-24 (1957) January.

Gas chromatography is particularly well suited for the analysis of mixtures of Freon flourinated hydrocarbons. Duplicate determinations can be made in 0.5 hour with an accuracy ±0.5% at the 50% level. Small amounts of air in Freon compounds can also be determined.
Author's Abstract

Tenneu, H. M. and Harris, R. J. SAMPLE INTRODUCTION SYSTEM FOR GAS CHROMATOGRAPHY. *Anal. Chem. 29,* 317-18 (1957) February.

Cl in Petroleum

Granatelli, L. DETERMINATION OF ORGANICALLY BOUND CHLORINE IN PETROLEUM FRACTIONS WITH OXYHYDROGEN BURNER. *Anal. Chem. 29,* 238-41 (1957) February.

Organically bound chlorine in petroleum fractions is converted to hydrogen chloride by combustion of the sample in the flame of a Beckman oxyhydrogen burner. Products of combustion are absorbed in demineralized water. Potentiometric determination of the chloride recovered from standards containing about 10 to 100 p.p.m. of chlorine indicates a standard deviation of about 2 p.p.m. The method of combustion, applicable to a wide variety of petroleum hydrocarbons, is rapid, as indicated by a burning rate of about 30 ml. per hour. Simplifications and improvements in the oxyhydrogen burner apparatus are presented.
Author's Abstract

Dust in Gas Streams

Dennis, R., Samples, W. R., Anderson, D. M., and Silverman, L. ISOKINETIC SAMPLING PROBES. *Ind. Eng. Chem. 49,* 294-302 (1957) February.

The aerodynamic characteristics of five specially designed sampling probes have been investigated in conjunction with a general study of isokinetic sampling methods and their relationship to correct representation of particulate concentrations in high velocity (1000 to 6000 feet per minute) gas streams.
Authors' Abstract

Fluorine in Coal

Bradford, H. R. FLUORINE IN WESTERN COALS. *Mining Eng. 9,* 78-79 (1957) January.

Fluorine was determined in six Western coals and in ash obtained from these coals in three different methods. D. M. Mason

Fuel Oil Stability

Armstrong, W. H., Milsom, D., Hebert, H. P. and Rescorla, A. R. PREDICT FUEL OIL STABILITIES. *Petrol. Processing 12,* 88-93 (1957) February.

A thirty-minute stability test for fuel oils to determine deterioration during storage uses reliable optical-density difference readings instead of the 6- to 8-hour gum filtration gravimetric test technique. G. Kunst

Milsom, D. and Rescorla, A. R. TIME-TEMPERATURE CHART. *Petrol. Processing 12,* 94-98 (1957) February.

New temperature-time storage chart for fuel oils based on the optical density difference test between an original and an accelerated temperature-oxidation tested sample gives accurate conversions of storage times at one temperature to equivalent storage times at another temperature. (See Armstrong, W. H. paper, this issue.) G. Kunst

Gas Analysis

McKelvey, J. M. and Hoelscher, H. E. APPARATUS FOR PREPARATION OF VERY DILUTE GAS MIXTURES. *Anal. Chem. 29,* 123 (1957) January.

Extremely dilute gas mixtures can be produced continuously and accurately over a wide range of concentration with a diffusion cell. Operation of the cell depends on diffusion of the vapor of a liquid into a gas stream.
Authors' Abstract

Waste-Water Tests

Happ, G. P., Stewart, D. W. and Cooper, H. C. MASS SPECTROMETRIC DETERMINATION OF VOLATILE SOLVENTS IN INDUS-

TRIAL WASTE WATER. *Anal. Chem. 29*, 68-71 (1957) January.

Trace amounts of volatile organic solvents present in waste water can be identified and determined directly with the mass spectrometer. Since it is not desirable to admit sewer water directly to the spectrometer inlet system, the vapor phase in equilibrium above the liquid, in an air-free system, is sampled and admitted. Two methods, one static and the other continuous, are used. Authors' Abstract

8. GENERAL AND PHYSICAL CHEMISTRY

Air Fractionation

Jakob, F. (assigned to Linde's Eismaschinen A-G) METHOD AND APPARATUS FOR FRACTIONATING AIR AND POWER PRODUCTION. U.S. 2,753,698 (1957) July 10.

This patent describes a liquid air fractionation process whereby a sufficient volume of operating medium is available for utilization of a turbine to produce the refrigeration required, even when relatively small amounts of air are fractionated. B. E. Eakin

CO-Steam Catalysts

Parravano, G. CARBON MONOXIDE-STEAM REACTION ON RUTHENIUM CATALYSTS. *Ind. Eng. Chem. 49*, 266-71 (1957) February.

Rate of reaction, depending on temperature and partial pressure ratios, may be controlled by reaction between adsorbed materials or between carbon monoxide and the oxidized ruthenium surface. Supports and heat pretreatment substantially affect activity. Iron appears to have higher activation energy, but its rate of reaction is faster. Both metal surfaces have a steady state oxidation level during catalysis, near the oxidation side. Author's Abstract

Equilibria

Osburn, J. O. HOW TO STRETCH YOUR EQUILIBRIUM DATA—II. *Chem. Eng. 64*, 270-278 (1957) February.

The first article described the use of the van Laar equations to extend vapor-liquid equilibrium data. This article describes a new way of taking data, a method of testing data to see if they are self consistent, and the use of equations which are sometimes better than the van Laar equations. R. T. Ellington

Gas Mixtures

Friedman, A. S. INTERMOLECULAR FORCES IN AIR. *J. Research Nat. Bur. Standards* (Paper 2738) *58*, 93-94 (1957) February.

The intermolecular force constants for a 6-12 Lennard-Jones potential model have been computed for air from second virial coefficients derived from experimental pressure-volume-temperature measurements. Nitrogen: oxygen interaction, second virial coefficients, and interaction force constants have also been derived. Author's Abstract

Graphite Structure

Wilson, L. G. and McDermot, H. L. THE STRUCTURE OF ARTIFICIAL GRAPHITES AS REVEALED BY X-RAY, ELECTRON MICROSCOPE, AND ADSORPTION STUDIES. *Can. J. Chem. 35*, 15-20 (1957) January.

The surface areas of three different graphites were studied and compared by means of the electron microscope, x-ray spectroscopy, and adsorption. The electron microscope is not amenable to quantitative work but the X-ray gave calculations of the same order of magnitude as the adsorption method and considering the approximations made, the agreement reached with the adsorption method is considered good. R. R. Amrine

Permeability

Norton, F. J., PERMEATION OF GASES THROUGH SOLIDS. *J. Appl. Physics 28*, 34-39 (1957) January.

The permeation process consists of the steps: adsorption, solution, diffusion, desorption. These are discussed for glasses, polymers, and metals. There are two generalizations: 1) All gases go through all polymers. 2) No rare gas permeates any metal. Criteria are given for measurements of the permeation process. In glasses the permeation rate depends on atomic size and glass composition. Some special processes which may stimulate permeation in vacuum devices are discussed: oxide dissociation, electrolysis in ceramic materials, nuclear reactions, and ionic impact.

Author's Abstract

Radio-isotope Techniques

Low, F. H. ARE YOU OVERLOOKING NUCLEAR RADIATION IN PROCESSING? *Oil Gas J. 55,* 121-24 (1957) February 4.

Lack of training or information has retarded the quick utilization of radioisotope techniques. However, courses are now available for industrial personnel at a number of institutions. The physical equipment selected for the radioisotope facility depends on desired accuracy and work to be done. Author's Abstract

Thermal Conductivity

Gambill, W. R. PREDICT THERMAL CONDUCTIVITY—I. *Chem. Eng. 64,* 237-40 (1957) February.

Thermal conductivities are frequently required for design calculations and the data are widely scattered through the literature. This article reviews a number of the approaches which have been used to predict thermal conductivities. R. T. Ellington

9. ORGANIC CHEMISTRY AND PETROCHEMICALS

Carbon Products

Marisic, M. M. and Hutchings, L. E. (assigned to The Pure Oil Company), PRODUCTION OF GRAPHITE. U.S. 2,780,527, (1957) February 5.

Wrigley, F. K. (assigned to Phillips Petroleum Company), APPARATUS FOR PRODUCING CARBON BLACK. U.S. 2,780,529 (1957) February 5.

Nitrogen Plants

AMMONIUM NITRATE PRODUCTION. *Petrol. Processing 12,* 107-09 (1957) February.

This process data-sheet gives flow equipment and economic information on the du Pont nitric acid processes and Canadian Patents and Developments, Ltd.'s ammonium nitrate prilling methods in Girdler-designed plants. G. Kunst

Oxidation Reactions

Blanchard, L. P., Farmer, J. B. and Ouellet, C. AN INVESTIGATION OF THE GAS-PHASE OXIDATION OF ACETALDEHYDE BY MEANS OF A RAPID-SCANNING MASS SPECTROMETER. *Can. J. Chem. 34,* 115-123 (1957) February.

A mass spectrometer equipped for continuous sampling and capable of producing 60 spectra per second has been used to follow the oxidation of acetaldehyde at temperatures in the region of 250° C. D. M. Mason

Lemay, A. and Ouellet, C. INFLUENCE DE L'OXYDE NITRIQUE ET D'AUTRES INHIBITEURS SUR L'OXYDATION LENTE DE L'ETHER. (INFLUENCE OF NITRIC OXIDE AND OTHER INHIBITORS ON THE SLOW OXIDATION OF ETHER.) *Can. J. Chem. 35,* 124-130 (1957) February.

The effect of small quantities of nitric oxide, propylene, formaldehyde, and hydrobromic acid upon the slow gas-phase oxidation of diethyl ether at 168° C. was studied. D. M. Mason

Tar Acids

Depp, E. A. and Neuworth, M. B. REFINING LOW TEMPERATURE TAR ACIDS WITH ION EXCHANGE RESINS. *Ind. Eng. Chem. 49,* 182-85 (1957) February.

Tar acids previously solvent-extracted are purified by ion exchange over strong base and strong acid resins. Butyric acid and tar bases are removed and recovery is essentially quantitative. The equilibria and rates of adsorption are sufficiently favorable to permit high liquid space rates and efficient utilization of the total capacity of the resins. E. B. Shultz, Jr.

10. CHEMICAL ENGINEERING

Boiler Water

REMOVAL OF SALTS FROM BOILER WATER. *Fuel Efficiency* (British) *5,* 83-84 (1957) February.

A brief description is given of the ion exchange process for water purification. It is concluded that with proper care the process is applicable to boiler feed treatment. Only elementary functioning of the process and general application are covered. No operating data are included. J. M. Reid

Data Reliability

Thrasher, L. W. and Binder, R. C. A PRACTICAL APPLICATION OF UNCERTAINTY CALCULATIONS TO MEASURED DATA. *Amer. Soc. Mech. Eng. Trans. 79,* 373-76 (1957) February.

In order to answer questions as to the relia-

bility of measurements, it is desirable to classify two types of measurements: a) the multiple sample, and b) the single sample. The case for multiple-sample measurements is well established, whereas the case for single sample has not been established. It is proposed that the tester estimate his error—the uncertainty interval—and give odds that the error would be less than the uncertainty interval if the measurement were repeated a large number of times. A numerical example is presented.

Authors' Abstract

Fluid Flow

Leva, M. FLOW THROUGH PACKINGS AND BEDS. *Chem. Eng. 64,* 263-68 (1957) February.

First of two articles on gas-liquid flow through random-packed towers, this deals with equipment components including the packing and its installation, the packing support and the liquid distributor. Author's Abstract

McKinney, A. H. USE "K'S" TO SPEED FLOW CALCULATIONS. *Chem. Eng. 64,* 243-47 (1957) February.

"K" factors from tables here enable you to use inconsistent units for Reynolds number, viscous and turbulent flow, and orifice calculations. Author's Abstract

Fluid Solids Handling

Schulman, B. L. and May, W. G. (assigned to Esso Research and Engineering Co.) APPARATUS FOR MEASURING THE FLOW RATES OF PARTICULATE SOLIDS. U.S. 2,776,566 (1957) January 8.

The flow rate of granular solids in suspension is determined by introducing a metered quantity of fluidizing gas between equal portions of distance L of the solids conduit to equalize pressure gradients, measuring the pressure differential, P_2-P, between the portions and calculating the rate by the formula: $V + 1/E (\Delta P/KL) + P_2U/P_2-P_1$, where V = velocity of solids; E = fraction voids in the suspension; ΔP = pressure drop over the distance L; K = proportionality factor; P_2 = static pressure at the portion downstream of the fluidizing gas inlet; P_2-P_1 = pressure differential between the portions; U = superficial velocity of fluidizing gas in conduit at pressure P_2.

E. J. Pyrcioch

Materials Handling

MATERIALS HANDLING: HOW GAS WORKS MAY BENEFIT. *Gas World* (British) *145,* 420-28 (1957) February 23.

Recommendations are summarized from a survey by the Materials Handling Subcommittee of the Institution of Production Engineers and from earlier papers which apply to handling conditions in British gas and appliance manufacture. Central responsibility for plant system, analysis of movement of the material and purpose of movement, mechanized equipment, training of operators and of management are considered. Brief illustrated descriptions are given of 16 items of handling equipment now available to the gas industry in Britain.

O. P. Brysch

Heat Exchangers

Newell, R. G. LOW-FINNED EXCHANGER TUBING. *Petrol. Processing 12,* 71-77 (1957) February.

The development of low-finned tubing has meant that designers of shell-and-tube heat exchangers can take advantage of extended surface in smaller diameter tubes. These fins have brought new problems into design calculations. The characteristics of extended surface and their effects on heat transfer calculations are shown. G. Kunst

Heat Transfer

Brown, H. E., Amstead, B. H., and Short, B. E. TEMPERATURE AND VELOCITY DISTRIBUTION AND TRANSFER OF HEAT IN A LIQUID METAL. *Amer. Soc. Mech. Eng. Trans. 79,* 279-85 (1957) February.

The results of an experimental investigation of the velocity and temperature distributions, together with the corresponding eddy diffusivity and heat-transfer results in a cooled stream of turbulently flowing mercury are presented. The temperature and velocity traverses of the mercury stream were made in a 1.61-in-ID nickel pipe over a range of Reynolds moduli of from approximately 250,000 to 800,000, with constant heat flux, and with the Prandtl modulus maintained substantially constant at 0.02. The relative radial position in a circular pipe at which the bulk mean temperature corresponds to the local temperature was found to be substantially constant and independent of the

Reynolds modulus for the range of Reynolds moduli employed. A similar velocity relationship was found to exist. The ratio α of the eddy diffusivity for heat transfer to the eddy diffusivity for momentum transfer at the mean radius was between 0.7 for the lower Reynolds number and 0.9 for the higher Reynolds number. It was found that, in the absence of an interfacial resistance effect, the Martinelli Lyon equation represents the heat-transfer data reasonably well, especially if allowance is made for the variation of the eddy diffusivity ratio α with the Reynolds number. Authors' Abstract

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Compressed Gas Safety

Allen, H. SAFE HANDLING OF GAS CYLINDERS. *Chem. Proc. Eng. 37*, 435 (1956) December.

Careful attention to details in developing codes of safe handling of compressed gas cylinders is needed for job training. Hoses, regulators, valves, explosive limits, storage and mechanical handling are discussed briefly. O. P. Brysch

Electrical Safety

RP-500: WHAT IT MEANS AND HOW TO USE IT. *Petrol. Processing 12*, 82-83 (1957) February.

Ground rules of safety established by the American Petroleum Institute's standard recommended practice have taken some of the guesswork out of classifying electrical equipment. The signifiacnce of RP-500 for the individual groups of processing hazards, and the use of the codes is outlined. G. Kunst

Feed-Water Heaters

Gardner, H. J. OPERATION AND MAINTENANCE OF ECONOMISERS. *Fuel Efficiency* (British) *5*, 67-70 (1957) February.

The author discusses the use of economizers primarily for boiler feed-water preheating on low-pressure industrial boilers common to the British industry. Maintenance and cleaning problems and methods are also covered. Examples are cited illustrating the value of economizer installations based on present fuel and equipment costs in Britain. J. M. Reid

Flow Measurement Standard

SEEK FLOW MEASUREMENT STANDARD. *Amer. Gas Assoc. Monthly 39*, 21, 47, 48 (1957) February.

International agreement on acceptable measurements was brought a step nearer to realization in a meeting of the International Organization for Standardization on July 12-14, 1956 in Munich, Germany. The consensus of the committee was that its activity be confined to codes for practical and industrial application. It was decided that the code will be limited, at present, to essential considerations of the primary pressure devices used in various countries; it will give values for their flow coefficients, including tolerances and specifications for the use of these devices. An appendix will include working examples, computations and examples on the assessment of errors. G. Kunst

Instrument Design

Wildhack, W. A., Dressler, R. F., and Lloyd, E. C. INVESTIGATIONS OF THE PROPERTIES OF CORRUGATED DIAPHRAGMS. *Amer. Soc. Mech. Eng. Trans. 79*, 65-82 (1957) January.

The pressure-deflection characteristics of corrugated diaphragms are correlated by methods of dimensional analysis. Experimental results for various sizes, materials, thicknesses, and shapes of diaphragms indicate that the performance for diaphragms of any given shape may be computed from a dimensionless formula derived from experimental data on other diaphragms of that shape. Linear shell equations are derived for combined bending and stretching effects with lateral loading terms for rotationally symmetrical shells in appropriate variations in shapes, and boundary conditions associated with practical diaphragm applications. The method used for solving this system of equations on an electronic digital computer is described and numerical solutions are presented. Suggestions are presented for future research on diaphragm properties and performance. Authors' Abstract

Maintenance

Wilks, H. V. ADOPT AN AREA FOREMAN PLAN. *Petrol. Processing 12*, 64-67 (1957) February.

The Celanese Corporation of America achieved better planning and better supervision of maintenance by adding a zone supervisor whose responsibility it was to direct sanely and eco-

nomically, in their respective zones, the services for maintenance, repair and replacement of equipment and direct construction. New facilities according to established standards and higher efficiency were achieved by creating this job. G. Kunst

12. MATERIALS OF CONSTRUCTION AND CORROSION

Coatings

Patterson, H. E. CHEMICAL SURFACE PREPARATION OF STEEL PRIOR TO PAINTING. *Corrosion 13,* 61t-68t (1957) January.

The proper surface preparation of metal prior to painting is becoming more and more important to industry. Experience has proven that a properly prepared surface will greatly increase the life of a paint system and of the product, and will reduce maintenance costs. Advantages and disadvantages of various types of cleaning are listed. Methods discussed include cleaning by solvent, alkali, emulsifiable solvent, steam, and acid. Other methods covered include pickling, the treating of pickled metal, the use of inhibitors in pickling, and the use of phosphate coatings. Author's Abstract

Williams, R. F. and Cogshall, J. H. AN ENGINEERING APPROACH TO THE ESTIMATING OF MAINTENANCE PAINTING. *Corrosion 13,* 3t-11t (1957) January.

Procedures which can be used to accurately estimate the cost of industrial maintenance painting are presented. This method takes into account the effect on painting cost of such variables as coating material, coating application, surface condition, pre-treatment, surface configuration, rigging, interference, environment and posture required for painter. Authors' Abstract

Commercial Plastics

GLOSSARY OF PLASTICS. *Petrol. Processing 12,* 129-130 (1957) February.

A helpful data-sheet listing name, maker, use and properties may dispel some of the confusion in the trade-name plastic materials. G. Kunst

Corrosion

Battle, J. L. CASING CORROSION IN THE PETROLEUM INDUSTRY. *Corrosion 13,* 132t-138t (1957) February.

The failure of production string casing as a result of corrosion in wells is rapidly becoming one of the most serious and perplexing problems to confront the industry. With the period of flush production behind the industry in many areas and more pronounced emphasis being placed on prolonged production under secondary recovery methods, practical solutions to this problem are being sought. This paper points out those areas in which the problem of casing corrosion is most troublesome, and lists the generally accepted causes, and means of preventing and repairing such failures. The more recently developed methods of investigation, such as the use of casing potential logs and current withdrawal-potential surveys, and the use of cathodic protection for preventing failures are discussed. Author's Abstract

Eldredge, G. G. ANALYSIS OF CORROSION PITTING BY EXTREME-VALUE STATISTICS AND ITS APPLICATION TO OIL WELL TUBING CALIPER SURVEYS. *Corrosion 13,* 51t-60t (1957) January.

A detailed account of the application of extreme value statistics to the analysis of depths of corrosion pits. Particular attention is given to the prediction of the expectation of deep pits and perforation of oil-well tubing from caliper survey data and a graphical method of analyzing this data is presented. G. G. Wilson

Hess, W. SHORT PERIOD TESTING WITH A NEW CORROSION TEST CHAMBER. *Ind. Finishing* (British) *9,* 342, 345 (1957) January.

A description of a new type of equipment for the production of a salt-fog atmosphere for corrosion testing. This equipment uses a centrifugal apparatus to produce the fog instead of a conventional spray nozzle. G. G. Wilson

H2S Corrosion of Metals

Bruns, F. J. EFFECT OF HOT HYDROGEN SULFIDE ENVIRONMENTS ON VARIOUS METALS. *Corrosion 13,* 27t-36t (1957) January.

The results of laboratory, pilot plant, and refinery corrosion tests of alloy steels and refinery corrosion tests of aluminum coated carbon

steels in high temperature (750-950° F.), hydrogen sulfide environments characteristic of platinum catalyst reformers and desulfurizers are presented. The laboratory tests covered a range of hydrogen sulfide concentrations from 0.09 to 10 mole per cent and the field tests 0.0002 to 1.2 mole per cent H_2S. G. G. Wilson

HIGH TEMPERATURE SULFIDE CORROSION IN CATALYTIC REFORMING ON LIGHT NAPHTHAS. *Corrosion 13*, 37t-42t (1957) January.

Sulfide corrosion difficulties encountered in a catalytic naphtha reformer operated at 800-975° F. are described, and the results of field and laboratory pilot plant studies of sulfide corrosion rates on carbon steel and chrome alloys are presented. The concentration of total sulfur varied from 0.0010 to 0.126 mole per cent in the laboratory tests and these tests indicated that H_2S concentrations under 0.008 mole per cent at approximately 1000° F. did not cause significant corrosion rates.

G. G. Wilson

13. NEW BOOKS

(C. A. Simms, Librarian)

A. P. I. Research

Amer. Petroleum Institute: FUNDAMENTAL RESEARCH ON OCCURRENCE AND RECOVERY OF PETROLEUM: REPORT OF PROGRESS, 1946-1947; 1948-1949; 1950-1951; 1952-1953. New York: The Institute: 1949 to date.

These four volumes contain the published papers arising from fundamental research studies on the occurrence and recovery of petroleum sponsored by the American Petroleum Institute. The primary purpose of these volumes is to present in convenient form all of the published results from the work of the several research projects. Included are reports on the following studies:

Project 27, "Function of Water in Production of Oil From Reservoirs."

Project 37, "Fundamentals of Hydrocarbon Behavior."

Project 43, "The Transformation of Organic Material into Petroleum" (Role of Microorganisms, and Radio-activity).

Project 47, "Mechanism of the Displacement of Oil from Porous Materials."

Project 49, "Clay-Mineral Standards."

Project 51, "Study of Near-Shore Recent Sadiments and Their Environments in the Northern Gulf of Mexico." B. E. Eakın

Domestic Heating

The Institute of Fuel, SPECIAL STUDY OF DOMESTIC HEATING IN THE UNITED KINGDOM—PRESENT AND FUTURE. The Institute, London (1956).

This 2-volume, 440-page book contains 44 papers presented May 1 and 2, 1956, in five Institute sessions on Fuels, Heating Methods and Appliances, Design of Dwellings, Planning and Administration of Smoke Control Areas, and General Discussions. The second volume contains 80 pages of combined discussion by participants in the sessions. This study covers the research accomplishments and programs of the Fuel Research Board and the Building Research Board on the problems of domestic heating in Britain. R. T. Ellington

Geophysics

Nettleton, L. L. (Ed.) GEOPHYSICAL CASE HISTORIES — Volume 1 — 1948. Houston, Texas: The Society of Exploration Geophysicists, (1949).

The purpose of the case history program of the Society of Exploration Geophysicists is to provide basic material by which geophysical surveys can be judged from later development and thus aid in the interpretation and evaluation of other geophysical work. Sixty Papers (published previously) have been grouped as salt dome, Mid-continent, Rocky Mountain, California and foreign case histories. The book is profusely illustrated, with several foldout maps included. B. E. Eakin

Reservoir Fluids

Burcik, E. J. PROPERTIES OF PETROLEUM RESERVOIR FLUIDS. New York: John Wiley and Sons, Inc. (1956).

An excellent elementary book describing the basic chemistry and physics of reservoir fluids. The book presents up-to-date material on the hydrocarbons which constitute petroleum, the behavior of hydrocarbons in the gaseous state, liquid systems, the qualitative and quantitative phase behavior of hydrocarbon systems, reservoir fluid characteristics, and fundamentals of the application of reservoir fluid characteristics to reservoir engineering. B. E. Eakin

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American Chemical Society, Journal
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American Petroleum Institute Quarterly
American Society for Testing Materials Bulletin
American Society of Mechanical Engineers. Transactions
Analytical Chemistry
Appliance Manufacturer
Association for Computing Machinery, Journal
Australian Journal of Applied Science
Australian Journal of Chemistry

Bituminous Coal Research Reports
Brennstoff-Chemie
British Coal Utilization Research Association Monthly Bulletin and Quarterly Gazette
Butane-Propane News

California Oil World
Canadian Chemical Processing
Canadian Gas Journal
Canadian Journal of Chemistry
Canadian Journal of Physics
Canadian Journal of Technology
Chemical and Engineering News
Chemical and Process Engineering
Chemical Engineering
Chemical Engineering Costs Quarterly
Chemical Engineering Progress
Chemical Engineering Science
Chemical Processing
Chemical Reviews
Chemical Society (London) Journal
Chemical Week
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Faraday Society. Transactions
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Gas and Oil Power
Gas Council (British) Publications
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Gas Journal
Gas Times
Gas und Wasserfach
Gas World

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Independent Petroleum Association of America Monthly
Industrial and Engineering Chemistry
Industrial Finishing
Industrial Gas (American)
Industrial Gas (British)
Industrial Heating
Institute of Fuel (British). Journal
Institute of Gas Technology Publications
Institute of Petroleum (British). Journal
Institution of Gas Engineers. Bulletins, Communications and Transactions
Instruments

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Journal des Usines a Gaz
Journal of Applied Chemistry
Journal of Applied Mechanics
Journal of Applied Physics
Journal of Chemical Physics
Journal of Metals
Journal of Organic Chemistry
Journal of Petroleum Technology
Journal of Physical Chemistry
Journal of Research (National Bureau of Standards)
Journal of Scientific Instruments

Laboratory Practice
LP-Gas
Lubrication

Materials and Methods
Mathematical Aids
Mechanical Engineering
Metal Progress
Mining Engineering

National Advisory Committee for Aeronautics, Reports
National Fire Protection Association Quarterly
National Gas Bulletin of Australia
National Petroleum News
Nuclear Science and Engineering
Nucleonics

Official Gazette of the U.S. Patent Office
Oil and Gas Journal

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Petroleum Engineer
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